

Technical Note – April 2013

Aspen Seed Collection and Cleaning

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Introduction

Production of aspen (*Populus tremuloides*) plants can be done in two ways; from root cuttings or from seeds. The former method is used to produce plants of a specific clone; and is generally used when selecting for high productivity. The latter method (from seed) is preferred for reclamation as it ensures that some of the genetic diversity found on natural sites is maintained.

Although growing aspen from seeds is relatively straight forward, the harvest and handling of aspen seed is more exigent. Aspen seed mature very early in the growing season and they are ripe weeks or months before most other species. Harvesting wild seed is a challenge due to the extremely small time window in which seeds can be successfully harvested prior to dispersal.

This document provides the most up-to-date information regarding aspen seed harvest and handling methods. Detailed information about aspen and harvesting aspen seeds can be found in our aspen body of knowledge.

Phenology

The easiest way to differentiate female and male trees in the field is by their reproductive structures. This can be done initially in the bud stage – vegetative buds are generally smaller and more pointed whereas reproductive buds are larger and more globose – the male buds being larger than the females (Figure 1). Buds differentiate into vegetative or reproductive structures (male or female) when they set in late July or early August. Reproductive and vegetative buds enter dormant in late summer and early fall and begin growth again in the early spring.

Aspen flowers in mid-April to early May, with seeds ripening within 4-6 weeks of flowering. Variation in flowering times from year to year are dependent on temperatures, with flowering and seed dispersal occurring earlier in warmer years.

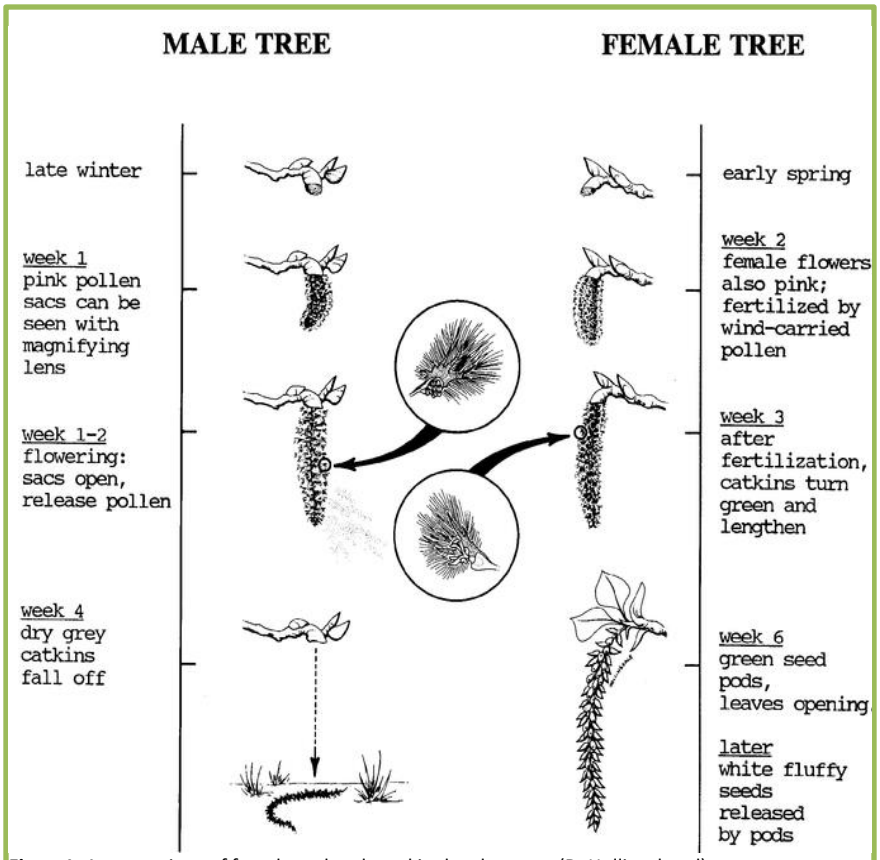

Figure1: A comparison of female and male catkin development (D. Hollingshead)

Identifying flowering clones

Because the seed harvest window is small, it is recommended that seed producing clones be identified early. Flower buds form in the fall and are present throughout the winter. It is during this winter period that clones with flower buds should be identified and marked for further investigation in the spring. It is recommended that all reproductive bud bearing clones be marked and an inventory kept for future reference and collection. Clones that will flower readily are identified by the large rounded buds that differ from the leaf buds, which are smaller and more acute or pointed. Female buds are similar to, but smaller, than the males (Figure 1). Trees that are on the margins of rights-of-way and roadsides are preferred.

Identifying female clones

Reproductive buds begin to expand in April and by about mid-April (during pollination) it is easy to differentiate male catkins from female with a good pair of binoculars.

Initially male catkins can look slightly pinkish in colour as the anthers are exposed but the colour changes to yellow-green as the pollen is released and often the entire clones will take on a green yellow hue. Pollination occurs over a period of one or two weeks (Beaubien 2011). After pollen is shed the male catkins shrivel and the females begin to enlarge (Figure 1). The female clones will have a slight green hue as the catkins elongate and capsules start to mature over the next three to four weeks. At this stage a


Figure 2: Male catkins in a breeze following pollen release. (F. Terpstra)

slight breeze will differentiate the lighter male catkins (Figure 2), from their stiffer, pendulous female counterparts. Following pollen release in some years, male catkins will fall before leaf-opening, giving an excellent, if relatively short window, to identify female catkins as they elongate and the capsules become prior to leaf flush (Figure 1).

Female candidate trees for harvest should be marked using GPS and paint or flagging.

Figure 3: Aspen capsules begin to split open

Monitoring clones for seed maturity

Once clones have been selected, they need to be monitored daily until seeds mature. Seeds should be harvested when seeds are a light straw colour. Seeds harvested before this time will not ripen and greatly reduce the germinability of the seed lot. Although immature seeds are paler and more translucent than mature seed, it isn't necessary to open up seed capsules to determine seed ripeness. Seeds are mature enough to harvest when the first capsule begins to split open and the white pappus (fluff) begins to break out (Figure 3). As soon as the first capsules crack, begin harvesting the entire clone to prevent loss when felling branches or whole trees. In warm weather the harvest window is three to five days. If there is a cold spell as the fluff begins to fly this window can be extended to seven to 10 days.

Figure 4: Female catkins, likely infested with larvae

Be aware that some capsules crack prematurely due to insect predation and these can mimic ripe capsules. Catkins infested by insect larva will start to dispel the fluff but the fluff will be clumped and remain attached to the catkin (Figure 4). If insects are found in significant number of catkins from a specific tree or clone, seeds should not be harvested.

Seed Collection and Processing

It is important that aspen seeds are not harvested during wet weather.

If trees are short, seeds can be harvested from branches cut from the trees using pole pruners or branches can be shot from the parent tree using a rifle with high velocity shells. Branches harvested in this way can be placed in tubs of water (figure 5) in warm dry location with little air movement for up to a week until capsules start to open at which time the capsules can be collected (Moench 1999). Water in which the branches are placed should be kept fresh to avoid fungal and bacterial growth.

Most seed harvest is completed by felling candidate trees.


Figure 5: Aspen branches placed in tubs of water

Catkins or individual capsules may be stripped into buckets or bags. Picking catkins rather than capsules dramatically increases field productivity and allows the seed material to be stored for longer periods before drying and processing. It is important that no leaves or other chaff are included as these will dry and crumble and are difficult to remove when cleaning. If the harvested catkins/capsules need to be transported to a drying area they must be kept in small containers and quickly moved to refrigerated conditions to prevent further ripening. On a warm, sunny day picked catkins will heat up in two to three hours. It is important to keep them in the shade and not have them more than 10 cm deep. They should be stored in mesh bags (onion or corn sacks) that allow air circulation. Large, paper yard waste bags are useful for transporting the capsules and keeping seed lots separate – pack two to three mesh bags per paper bag (figure 6). Kept cool (4 ºC) capsules may be stored for a brief period before cleaning (no more than four days). It is however, recommended that seed be extracted as soon as possible to avoid loss of viability or seed vitality. If capsules are to be dried and cleaned immediately, spread the material out on a dry flat surface, such as a tarp, and cover with screening material, such as window screening, to prevent seed loss by air movement.


Figure 6: Aspen capsules stored in mesh bag

If the harvester has access to a building kept at a normal temperature (not over heated), freshly harvested catkins can be spread (one layer thick) on strips of brown paper and cover with a mesh to prevent the lost by air movement and allow air circulation. Once the collection is complete, catkins can be placed in paper bags for transport to the seed extraction facility. Insure to capture all seed that fall on the paper during handling. This technique allows excess moisture to evaporate and keep seed cool.

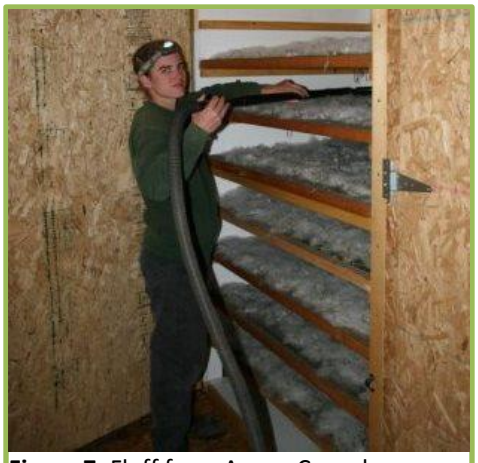
Figure 7: Fluff from Aspen Capsules

Seed Cleaning

As the capsules dry, they will split to release the seeds with the attached white pappus. Spread the catkins out in a thin layer – the fluff needs room to expand (figure 7). If the fluff mats together in the drying process (from the catkins getting moist), it will not open to release the seed. Capsules require 2-4 days under ambient air temperatures to open. Processing before the catkins are completely crisp can help reduce the amount of chaff added to the seed. Fluff can be

vacuumed into bags and tumbled to release the seed. Ideally only the white fluff should be sucked up with the vacuum. Seeds can be cleaned using a strong air flow through screens of appropriate size (60, 40, 20 and 10-mesh) (Figure 8 & 9).

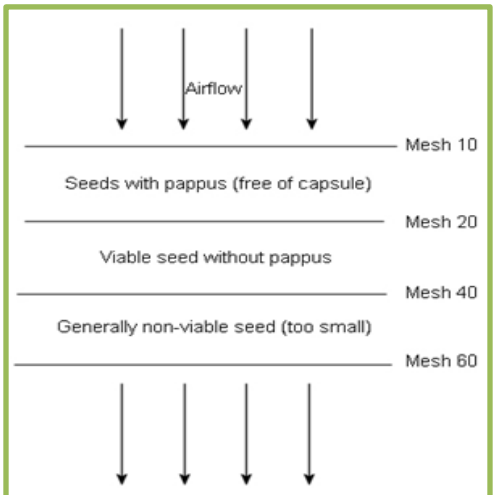

Figure 8: Methodology of aspen seed cleaning


Figure 9: Aspen seed cleaning (DMI)

Seeds with pappus attached can be placed in a sieve with openings large enough for seed to fall through (between 10 and 20-mesh). Stack remaining screens such that the highest mesh (smallest holes) is at the bottom. Air (generally from a vacuum) is blown through the top screen as the screens are agitated. This is usually sufficient to separate seeds from the flush and they will be deposited in the lower screen. Alternatively the vacuum hose is placed under the bottom screen such seeds are sucked into the lower screen. Seed between the 60 and 40-mesh are usually not viable, whereas those between 20 and 40 mesh are generally uniform (Fung and Hamel 1993). Remaining fluff and other chaff should be vacuumed into a bag for clean disposal. Final cleaning of seed and separation of heavy seed from lighter seed can be done with an air-column seed cleaner.

Seed Storage

Seeds loose viability very quickly and should be sown or prepared for storage immediately after cleaning. Young and Young (1992) state that storing fully matured and properly dried aspen seeds at 5°C can preserve viability for two years and in extreme cases up to six years. ATISC recommends storage of seeds at -18°C (at a moisture content of 5-8%) to retain viability although there is some indication that a higher moisture content of 8-10% may be more advantageous (Marenholtz 2011).


Figure10: Mason jars sealed with clean aspen seed

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